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EFFECT OF COPPER SULFATE ON THE OPSONIC INDEX IN BRUCELLOSIS

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In a number of neuroinfections at the Turkmen Institute of Neurology and Physiotherapy, use has been made of microdoses of biotic elements (biotics). These stimulate the physiological processes which are connected with the protective functions of the living organism (Venchikov).

Of the biotic elements which have been employed, copper sulfate solutions in physiological concentration occupy one of the chief places. Copper is an important element for life, stimulating blood formation and participating as a biocatalyst in the oxidation-reduction processes. According to Venchikov and Gerasimova, copper solutions in the physiological concentration stimulate gas metabolism.

Copper solutions must be of physiological concentration (about 0.003 mg%), i.e., exactly that concentration at which copper takes part in the physiological processes, since higher concentrations can either produce a braking action on the reaction of a cell or have a toxic effect on it. To ascertain what effect copper has on the capacity of leucocytes for phagocytosis in patients suffering from brucellosis, we employed the opsonic-phagocytary reaction.

As is well known, brucellosis in the majority of cases is accompanied by neutropenia, which is the result of the suppression of myelopoiesis by the brucellosis toxin (Udintsev, Frolovskaya, Mezenchuk). Ryzhik observed in cases of brucellosis the presence of degenerative neutrophils in the bone marrow, while Fingerov observed them in the peripheral blood; the latter explained the low opsonic index of patients with brucellosis by this phenomenon. If the biotic element has a favorable effect on the modified leucocytes and activates them, then the opsonic index must be increased under these circumstances.

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We performed the opsonic-phagocytary reaction with the blood of brucellosis patients and with a killed culture of brucella according to the method described by Shtriter [Streeter?]. At the same time we added to the citrate blood of these patients microdoses of biotic elements, in the case of some experiments copper sulfate, while in the case of others we added uranium acetate. The test tubes filled with blood were placed in a constant-temperature closet at a temperature of 37°C for 30 min, after which the blood was subjected to the opsonic-phagocytary reaction with the killed culture of brucella. In most cases, we obtained a noticeable increase of the opsonic index as compared with control experiments.

To ascertain whether the biotics acted on the leucocytes or on the bacteria, we performed parallel modified experiments in which the biotics were not added to the blood of a patient, but to the killed culture of brucella. It was found that in such an experiment the opsonic index did not change, even though the biotics added to the brucella culture were later mixed with blood and were then able to act on the leucocytes. It can be assumed that in these cases the biotic elements were inactivated through their absorption by the protein substances of bacteria.

Altogether 85 reactions in vitro, with the addition of biotic elements to blood of a patient, were carried out parallel with the usual type of experiment. Of this number, 72 experiments were conducted with the addition of copper sulfate solution (0.003 mg%) and 13 experiments with the addition of uranium acetate solution (0.003 mg%). When uranium acetate solution was added, we observed no change in the index; it is possible that the solution was not of the optimum concentration. When copper sulfate solution was added, however, a definite increase in the opsonic index was noted in 64 experiments, no change in six experiments, and a decrease in two experiments.

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